

ABSTRACT

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Title of the diploma thesis: Automation of liberation tests for releasing biologically active substance from nanofibers

The main goal of this diploma thesis is an automation of TTC liberation from nanofibers, using non-separation flow method sequential injection analysis. UV-VIS spectrophotometer was used for the detection of signal. Measurements were carried out using 1-3 connected Franz cells in parallel, placed in the water bath. Buffer solutions with pH 7.4 and 4.5 were used as liberation media. The liberation of TTC was realized from two different nanofiber carriers – types „A“ and „AK“, Difference was in their preparation process. Because of this, each of them revealed various characteristics mainly related to the amount of bound TTC and the way of its binding to the nanofiber carrier. Production of these nanofibers was realized by Technical University Liberec using the technology NanoSpider™.

Measurements were performed under various predetermined conditions, representing the state of the human skin – two different pH (7.4; 4.5) and temperature (32°C; 37°C) values. Four different types of membrane filters were also used, which influenced the liberation profiles in various ways during the tests. The filters were made of polyamide, polytetrafluorethylen, polycarbonate material and material created from esters of cellulose. In the end only one membrane filter was chosen, that had the most optimal properties for the next measurements – optimally prolonged the liberation of TTC from the carrier, so that differences in tested materials were clearly visible, but otherwise the liberation profile didn't influence that much.

Finally, the obtained liberation profiles were evaluated and compared. The main monitored parameters were the release rate of TTC from the nanofiber carrier and the final values of the released TTC, which were achieved under the different measurement conditions.